Claims:

1. A photothermographic material comprising a support having thereon, one or more imaging layers comprising:

a. a photosensitive silver halide,

b. in reactive association with said photosensitive silver halide, a non-photosensitive source of reducible silver ions,

c. a reducing agent for said reducible silver ions, and

d. one or more X-radiation-sensitive phosphors each of which emits in the range of from about 100 to about 410 nm, said X-radiation-sensitive phosphor comprising a rare earth phosphate, a yttrium phosphate, a strontium phosphate, or a strontium fluoroborate.

2. The material of claim 1 comprising a cerium activated rare earth phosphate, a yttrium phosphate, or a europium activated strontium fluoroborate as said X-radiation-sensitive phosphor.

3. The material of claim 1 wherein said X-radiation-sensitive phosphor has a zircon or monazite crystal structure.

4. The material of claim 2 comprising a europium activated strontium fluoroborate having a composition defined from the following Structure (I) as said X-radiation-sensitive phosphor:

$$M_aF_bB_cO_d:eEu \quad (I)$$

wherein M is strontium, or a mixture of metals containing strontium and one or more of the metals Mg or Ca, F is fluoride, B is boron, O is oxygen, $0 < a \leq 1.5$, $0 < b \leq 0.5$, $2 < c \leq 5$, $3 < d \leq 7$, $0 < e \leq 0.25$, and $0 < a + e \leq 2$.

5. The material of claim 1 comprising a strontium phosphate having a composition defined by the following Structure (II) as said X-radiation-sensitive phosphor:

$$M^1_{a1}M^2_{b1}M^3_{c1}P_{d1}O_{e1}$$

(II)

wherein M^1 and M^2 are different metals selected from the group consisting of Mg, Ca, Sr, and Zn, M^3 is one or more of the metals Eu, Mn, Sn, and Pb, $0 < a1 \leq 1$, $0 < b1 \leq 1$, $0 < c1 \leq 0.2$, $0 < a1 + b1 + c1 \leq 2$, $0 < d1 \leq 4$, and $0 < e1 \leq 10$.

6. The material of claim 1 comprising a cerium and strontium activated rare earth phosphate or yttrium phosphate as said X-radiation-sensitive phosphor.

7. The material of claim 6 comprising a cerium and strontium activated or co-activated rare earth phosphate or a cerium and strontium activated yttrium phosphate having a composition defined by the following Structure (III) as said X-radiation-sensitive phosphor:

$$M^1_{a2}M^2_{b2}M^3_{c2}M^4_{d2}P_{e2}O_f$$

(III)

wherein M^1 is lanthanum or yttrium, M^2 is cerium, M^3 is gadolinium, ytterbium, or a mixture thereof, M^4 is strontium or a strontium-containing mixture of alkaline earth metals, $0 < a2 \leq 1$, $0 < b2 \leq 0.6$, $0 \leq c2 \leq 0.5$, $0 \leq d2 \leq 0.1$, $0 < a2 + b2 + c2 + d2 \leq (e2 + 1)$, and $0 < f \leq (4.5e2)$.

8. The material of claim 7 wherein said X-radiation-sensitive phosphor has a monazite crystal structure and a composition that is defined by the following Structure (IV):

$$M^1_{a2}M^2_{b2}M^4_{d2}P_{e2}O_f$$

(IV)

wherein M^1 is lanthanum, M^2 is cerium, M^4 is strontium or a strontium-containing mixture of alkaline earth metals, $0.5 < a2 \leq 1$, $0.005 < b2 \leq 0.3$, $0 \leq d2 \leq 0.1$, $0 < a2 + b2 + d2 \leq (e2 + 1)$, and $(3.5e2) < f \leq (4.5e2)$.

9. The material of claim 1 comprising $LaPO_4$:Ce (P-1), YPO_4:Ce (P-2), SrB_4O_7:Eu,F (P-3), $BaMgAl_{11}O_{19}$:Ce (P-4), and $Sr_2P_2O_7$:Eu (P-5), or a mixture of two or more these compounds, as said X-radiation-sensitive phosphor(s).

10. The material of claim 1 wherein said X-radiation-sensitive phosphor is present in an amount of from about 1 to about 20 mole per mole of total silver and the total silver present in said material is at least 0.002 mol/m^2.

11. The material of claim 1 wherein said photosensitive silver halide and said X-radiation-sensitive phosphor are in the same imaging layer.

12. The material of claim 1 comprising the same or a different imaging layer(s) on both sides of said support.

13. The material of claim 1 wherein said binder is a hydrophobic binder.

14. The material of claim 1 wherein said binder is a hydrophilic binder or a hydrophobic polymer applied as a water-dispersible polymeric latex.

15 The material of claim 1 wherein said photosensitive silver halide is tabular silver halide containing an iridium dopant.

16. The material of claim 1 wherein said non-photosensitive source of reducible silver ions is:

a) a silver salt of a fatty acid having from 10 to 30 carbon atoms, or a mixture of said silver salts, at least one of which is silver behenate,

b) a silver salt of a compound containing an imino group, or a mixture of said silver salts, at least one of which is silver benzotriazole, or

c) a mixture of a) and b).

17. The material of claim 1 wherein said one or more imaging layers further comprise a spectral sensitizing dye, an acutance dye, a toner, a co-developer, or a contrast-enhancing agent.

18. The material of claim 1 wherein said photosensitive silver halide has been chemically sensitized with a sulfur-containing chemical sensitizing compound, a selenium-containing chemical sensitizing compound, a tellurium-containing chemical sensitizing compound, or a gold(III)-containing chemical sensitizing compound, or mixtures of any of these chemical sensitizing agents.

19. The material of claim 1 wherein said imaging layer comprising said X-radiation-sensitive phosphor has a dry coating weight of at least 5 g/m^2.

20. An X-radiation sensitive photothermographic material comprising a support having on one side thereof, a photothermographic imaging layer having a dry coating weight of from about 300 to about 400 g/m^2, said imaging layer comprising a binder and in reactive association:

a. a photosensitive silver bromide or silver bromoiodide, or mixture thereof, that has been chemically sensitized with a sulfur-containing chemical sensitizing compound, a selenium-containing chemical sensitizing compound, a tellurium-containing chemical sensitizing compound, or a gold(III)-containing chemical sensitizing compound, or mixtures of any of these chemical sensitizing agents,

b. in reactive association with said photosensitive silver halide, a non-photosensitive source of reducible silver ions comprising silver behenate, silver benzotriazole, or a mixture thereof,

c. a reducing agent for said reducible silver ions that comprises a hindered phenol or an ascorbic acid reducing agent, and

d. one or more X-radiation-sensitive phosphors, each of which emits in the range of from about 100 to about 410 nm, said one or more X-radiation-sensitive phosphors being present in a total amount of from about 0.5 to about 20 mole per mole of total silver, the amount of total silver being from about 1 to about 5 g/m^2, and

said X-radiation-sensitive phosphor having a monazite crystal structure and a composition that is defined by the following Structure (IV):

$$M^1_{a2}M^2_{b2}M^4_{d2}P_{e2}O_f$$

(IV)

wherein M^1 is lanthanum, M^2 is cerium, M^4 is strontium or a strontium-containing mixture of alkaline earth metals, $0.5 < a2 \leq 1$, $0.005 < b2 \leq 0.3$, $0 \leq d2 \leq 0.1$, $0 < a2 + b2 + d2 \leq (e2 + 1)$, and $(3.5e2) < f \leq (4.5e2)$.

21. The material of claim 20 further comprising the same or a different photothermographic imaging layer on the backside of said support.

22. A method for forming a visible image comprising:

(A) imagewise exposing the photothermographic material of Claim 1 to X-radiation to form a latent image, and

(B) simultaneously or sequentially, heating said exposed photothermographic material to develop said latent image into a visible image.

23. The method of claim 22 for providing a radiographic image of a human or animal subject.

24. The method of claim 22 comprising using said visible image for a dental diagnosis.

25. A method for forming a visible image comprising:

(A) imagewise exposing the photothermographic material of Claim 20 to X-radiation to form a latent image, and

(B) simultaneously or sequentially, heating said exposed photothermographic material to develop said latent image into a visible image.